

Trend Study 30-5-03

Study site name: Harmony Mountain Summit.

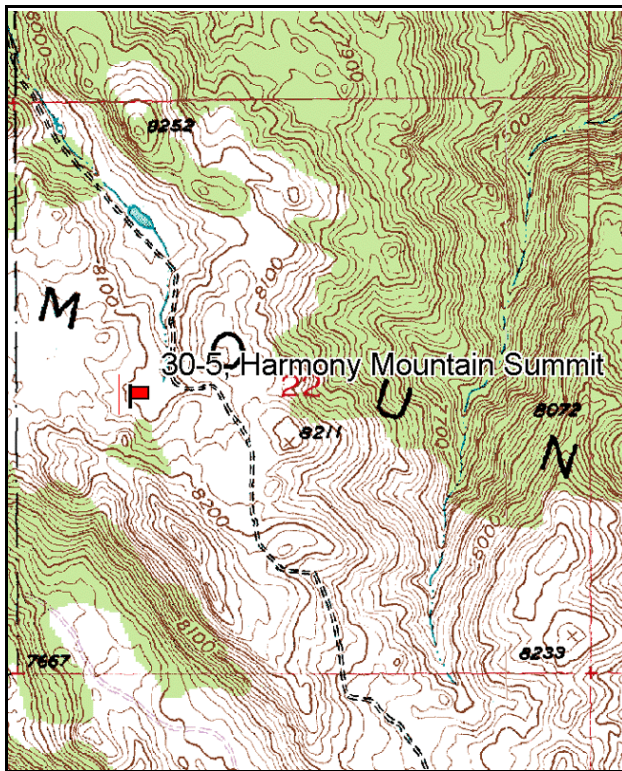
Vegetation type: Low Rabbitbrush.

Compass bearing: frequency baseline 266 degrees magnetic. (Lines 3 & 4, 202°M)

Frequency belt placement: line 1 (12 & 87ft), line 2 (34ft), line 3 (59ft), line 4 (71ft). Rebar: belt 3 on 1ft.

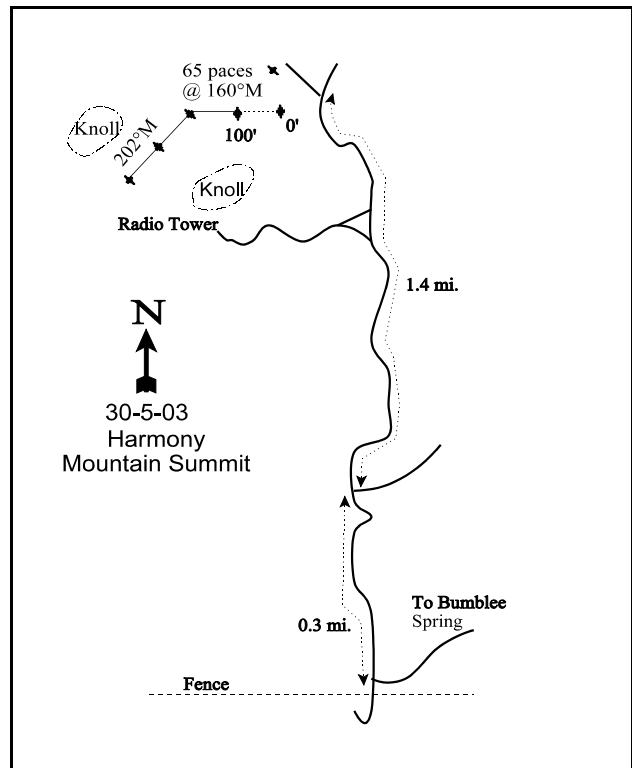
LOCATION DESCRIPTION

From the Dixie National Forest boundary north of New Harmony, proceed north 0.3 miles on Pace Draw Road. Turn right on Harmony Mountain Road and drive 1.0 miles, at which point you should come to a gate. From the fence continue on the main road 4.7 miles to a fork. Stay left and continue on the main road. At 0.3 miles stay left again and continue on the main road 1.4 miles to a fork. Continue left less than 0.1 miles to a witness post on the left (south) side of the road. From the witness post walk 65 paces at 160 degrees magnetic to the 0-foot stake. The study is marked by green steel fence posts approximately 18 to 24 inches in height.



Map Name: Stoddard Mountain

Township 37S, Range 13W, Section 22



Diagrammatic Sketch

GPS: NAD 27, UTM 12S 4159822 N, 296544 E

DISCUSSION

Harmony Mountain Summit - Trend Study No. 30-5

The Harmony Mountain Summit study monitors deer summer range at 8,100 feet in elevation. Slope is 10% to 15% with a northeast aspect. This area is characterized by open parks interspersed with scattered aspen and oak clones. The area has been heavily impacted by domestic livestock grazing and undergone a nearly complete type conversion to rabbitbrush. What formerly was a mountain big sagebrush-grass type is now dominated by stickyleaf low rabbitbrush, needlegrass species, and limited numbers of increaser forb species. Cattle were using the site during the 1992 reading in mid-June. Deer also utilize the area in summer as two does were encountered on the site during the 1992 reading. Pellet group data taken on the site in 1998 estimated 73 deer and 26 cow days use/acre (180 ddu/ha and 64 cdu/acre). Many of the deer pellet groups appeared to be relatively recent. Cattle pats appeared to be older, although cows were seen down the road from the site. Pellet group data from 2003 estimated 88 deer days use/acre and 32 cow days use/acre (216 ddu/ha and 79 cdu/ha). Most of the deer pellet groups were from spring and summer use.

Soils are relatively deep and formed by sedimentation from surrounding ridges. Effective rooting depth is estimated at just over 17 inches. Soil texture is a sandy loam which is strongly acidic (pH 5.4). Soil organic matter is comparatively high at 4.5%. The principal soil disturbance comes from pocket gopher and rock squirrel activity, as well as livestock trampling. Soil erosion is minimal due to abundant vegetation and litter cover.

This area is considered summer range for deer, therefore shrubs are not the key vegetational component. However, the key browse species present on the site is mountain big sagebrush which provided 37% of the browse cover in 1998 and 49% of the cover in 2003. Density of sagebrush has increased from 1,532 plants/acre in 1982 to 8,640 plants/acre in 2003. Seedling and young recruitment has been good since 1992 indicating an expanding population. Utilization is mostly light, vigor good, and percent decadence low.

Stickyleaf low rabbitbrush is the most abundant shrub on the site. It provided 62% of the total shrub cover in 1998 and 50% in 2003. It has increased in density from 8,666 to 12,100 plants/acre between 1982 and 2003. Young recruitment has been excellent with each reading yet the population is becoming increasingly mature as it has apparently reached its carrying capacity. Most plants are not utilized and in good vigor. Other browse species found on the site include Parry rabbitbrush, slenderbush eriogonum, barberry, and snowberry. A few aspen trees are also found near the baseline.

The herbaceous understory is abundant and diverse although composition consists largely of increasers. The grass composition is dominated by Letterman needlegrass, subalpine needlegrass, and needle-and-thread grass. These grasses accounted for 92% of the grass cover in 1998 and 94% in 2003. Virtually all grass plants were 30% to 50% utilized in 1982. Many of the grasses were grazed in 1992, but percent utilization was not estimated. The site was reread on July 1st of 1998 and it did not appear that cows had been on the site at that time. More preferred grasses which would be considered decreasers on this site, include low numbers of slender wheatgrass and mountain brome.

Forbs are also abundant, except composition consists largely of increasers like pale agoseris, common dandelion, and the poisonous silky lupine. The more palatable species, Indian paintbrush and redroot eriogonum, have shown evidence of at least moderate use in the past. Pale agoseris and silky lupine produced 69% of the total forb cover in 1998 and 72% in 2003. Most other forbs produced less than one-half of 1% cover. Other, more preferred forbs are present, but in low numbers.

1982 APPARENT TREND ASSESSMENT

On this site, soil is stable with excellent protective ground cover to prevent erosion. However, vegetatively there are definite problems, most coming from livestock use. Stickyleaf low rabbitbrush currently dominates the site and is increasing. The more desirable mountain big sagebrush is declining and increaser grasses, especially the needlegrass species, will likely increase. Forbs, which are of great importance to deer in the summer, are not abundant.

1992 TREND ASSESSMENT

Erosion is not evident on this site. Basal vegetative cover has increased by 14% since 1982, while percent bare ground has decreased by 62%. Trend for soil is up. The trend for browse is mixed. The key browse species, mountain big sagebrush, has increased dramatically since the last reading. It has good vigor and low percent decadence. Slender eriogonum has also increased in density. On the downside, the increaser stickyleaf low rabbitbrush has also increased on the site and has an age structure that indicates possible continued increase, especially with continued heavy use of the herbaceous understory by livestock. Trend for browse is up slightly, but close attention should be given to stickyleaf low rabbitbrush in the future. The trend for the herbaceous understory is also up, even though it is dominated by less desirable increaser species and poisonous plants.

TREND ASSESSMENT

soil - up (5)

browse - up slightly (4)

herbaceous understory - up, but dominated by increaser species (5)

1998 TREND ASSESSMENT

Trend for soil is stable with abundant vegetation and litter cover. Percent bare ground increased slightly, but it is still less than 10%. Erosion is not a problem on this site. Trend for browse is stable. Density of mountain big sagebrush is comparable to 1992 estimates. The population has become more mature, yet young plants are still common. Utilization is light, vigor good, and percent decadence low at only 7%. Stickyleaf low rabbitbrush is still the most abundant shrub on the site. Density of this increaser shrub has declined slightly, although some of the difference may be due to the much larger sample used in 1998. Young plants are still common, vigor is good, and percent decadence is low at 8%. Trend for the herbaceous understory is down slightly. Sum of nested frequency for perennial grasses and forbs has declined. Nested frequency of the most common grass, Letterman needlegrass, has remained similar but frequency of subalpine needlegrass declined significantly. Nested frequency of pale agoseris, Indian paintbrush, redroot eriogonum, and silky lupine all declined significantly.

TREND ASSESSMENT

soil - stable (3)

browse - stable (3)

herbaceous understory - down slightly (2)

2003 TREND ASSESSMENT

Trend for soil continues to be stable. Vegetation and litter cover declined since 1998 yet there is still little bare ground exposed and erosion is not a problem on this site. Trend for browse is up, but on a summer range this it not necessarily desirable. Density of mountain big sagebrush has increased by 30% since 1998 to a very high 8,640 plants/acre. The population is dynamic with high numbers of seedlings and young. The

increaser, stickyleaf low rabbitbrush, still dominates the browse composition and it has also increased in density to 12,100 plants/acre. This population is also dynamic with abundant young plants. However, the population will likely not increase significantly in the future since it appears to be at or near carrying capacity. The shrubs together produced 38% cover in 2003. Steps should be taken to reduce shrubs on this site. Trend for the herbaceous understory is down and species composition remains poor due to domination of increaser grasses and forbs. Sum of nested frequency for perennial grasses has declined with a significant decline in both needle-and-thread and Letterman needlegrass. Sum of nested frequency for perennial forbs declined more sharply. Total grass cover decreased by 37%, although total forb cover declined by 60%. Some of the decline in grasses and especially forbs is due to the incredibly dry conditions during the past few years. Herbaceous plants are the most important vegetational aspect of this site since it is considered summer range. For deer, perennial forbs are very important especially in the spring and early summer. Due to past and continued heavy livestock use of this area, sagebrush and stickyleaf low rabbitbrush have increased dramatically and the increaser needle grass dominates the herbaceous understory. More desirable grasses and forbs are not abundant. A prescribed burn would do much to enhance the herbaceous understory in this area.

TREND ASSESSMENT

soil - stable (3)

browse - up (5)

herbaceous understory - down (1)

HERBACEOUS TRENDS --

Management unit 30 , Study no: 5

| Type | Species | Nested Frequency | | | Average Cover % | |
|-----------------------------|--------------------------|------------------|------------------|------------------|-----------------|-------|
| | | '92 | '98 | '03 | '98 | '03 |
| G | Agropyron trachycaulum | - | 4 | 3 | .09 | .00 |
| G | Bromus carinatus | 8 | 7 | 3 | .13 | .06 |
| G | Carex spp. | 7 | 11 | 5 | .56 | .41 |
| G | Poa fendleriana | 3 | 7 | 4 | .21 | .06 |
| G | Poa pratensis | 27 | 20 | 10 | .55 | .18 |
| G | Stipa columbiana | _b 289 | _a 208 | _a 250 | 5.40 | 4.10 |
| G | Stipa comata | _b 119 | _b 112 | _a 54 | 2.92 | .99 |
| G | Stipa lettermani | _b 287 | _b 256 | _a 220 | 10.28 | 6.90 |
| Total for Annual Grasses | | 0 | 0 | 0 | 0 | 0 |
| Total for Perennial Grasses | | 740 | 625 | 549 | 20.17 | 12.73 |
| Total for Grasses | | 740 | 625 | 549 | 20.17 | 12.73 |
| F | Achillea millefolium | - | 7 | 3 | .18 | .00 |
| F | Agoseris glauca | _b 251 | _a 187 | _a 172 | 3.87 | 2.25 |
| F | Antennaria rosea | 3 | - | - | - | - |
| F | Artemisia ludoviciana | 3 | - | - | - | - |
| F | Astragalus spp. | 4 | 2 | - | .03 | - |
| F | Astragalus utahensis | - | 6 | - | .18 | - |
| F | Castilleja linariaefolia | _c 53 | _b 23 | _a 1 | .27 | .00 |

| T y p e | Species | Nested Frequency | | | Average Cover % | |
|---------------------------|----------------------------|------------------|------------------|------------------|--------------------|------|
| | | '92 | '98 | '03 | '98 | '03 |
| F | Calochortus nuttallii | - | 2 | 2 | .01 | .01 |
| F | Chenopodium fremontii (a) | - | 28 | 25 | .13 | .10 |
| F | Collinsia parviflora (a) | - | 14 | 3 | .13 | .01 |
| F | Crepis acuminata | a ⁻ | b ³⁴ | a ⁻ | .34 | - |
| F | Delphinium nuttallianum | - | a ¹ | b ¹⁵ | .03 | .06 |
| F | Epilobium brachycarpum (a) | - | 3 | 1 | .00 | .00 |
| F | Erigeron eatonii | a ⁻ | a ¹ | b ⁸ | .01 | .07 |
| F | Erigeron pumilus | 3 | 2 | 2 | .01 | .00 |
| F | Eriogonum racemosum | a ⁴ | b ¹² | ab ⁹ | .30 | .07 |
| F | Fritillaria atropurpurea | 1 | - | - | - | - |
| F | Galium spp. | a ⁻ | b ¹³ | a ⁻ | .21 | - |
| F | Gayophytum ramosissimum(a) | - | - | 3 | - | .00 |
| F | Hackelia patens | a ¹⁰ | b ²⁸ | ab ²⁰ | .56 | .58 |
| F | Hymenoxys acaulis | - | 6 | - | .01 | - |
| F | Hydrophyllum occidentale | 3 | - | - | - | - |
| F | Lomatium spp. | - | 1 | 6 | .00 | .01 |
| F | Lupinus sericeus | c ²¹⁹ | b ⁸⁶ | a ³⁵ | 3.59 | .94 |
| F | Penstemon spp. | - | 3 | - | .03 | - |
| F | Polygonum douglasii (a) | - | b ¹⁵⁶ | a ²² | .72 | .05 |
| F | Taraxacum officinale | b ³² | a ¹⁵ | a ¹⁷ | .22 | .17 |
| Total for Annual Forbs | | 0 | 201 | 54 | 0.98 | 0.17 |
| Total for Perennial Forbs | | 586 | 429 | 290 | 9.90 | 4.20 |
| Total for Forbs | | 586 | 630 | 344 | 10.89 | 4.38 |

Values with different subscript letters are significantly different at alpha = 0.10

BROWSE TRENDS --

Management unit 30 , Study no: 5

| Type | Species | Strip Frequency | | Average Cover % | |
|------------------|--|-----------------|-----|-----------------|-------|
| | | '98 | '03 | '98 | '03 |
| B | <i>Artemisia tridentata vaseyana</i> | 92 | 98 | 13.89 | 18.95 |
| B | <i>Chrysothamnus nauseosus</i> | 0 | 0 | - | .03 |
| B | <i>Chrysothamnus parryi</i> | 0 | 16 | - | .32 |
| B | <i>Chrysothamnus viscidiflorus viscidiflorus</i> | 96 | 96 | 23.36 | 19.12 |
| B | <i>Mahonia repens</i> | 1 | 3 | .06 | .01 |
| B | <i>Populus tremuloides</i> | 1 | 0 | .18 | - |
| B | <i>Symphoricarpos oreophilus</i> | 1 | 3 | .18 | .18 |
| Total for Browse | | 191 | 216 | 37.68 | 38.61 |

CANOPY COVER, LINE INTERCEPT --

Management unit 30 , Study no: 5

| Species | Percent Cover |
|--|---------------|
| | '03 |
| <i>Artemisia tridentata vaseyana</i> | 16.51 |
| <i>Chrysothamnus parryi</i> | .46 |
| <i>Chrysothamnus viscidiflorus viscidiflorus</i> | 22.04 |
| <i>Mahonia repens</i> | .10 |
| <i>Populus tremuloides</i> | 3.79 |
| <i>Symphoricarpos oreophilus</i> | .91 |

KEY BROWSE ANNUAL LEADER GROWTH --

Management unit 30 , Study no: 5

| Species | Average leader growth (in) |
|--------------------------------------|----------------------------|
| | '03 |
| <i>Artemisia tridentata vaseyana</i> | 1.0 |

BASIC COVER --

Management unit 30 , Study no: 5

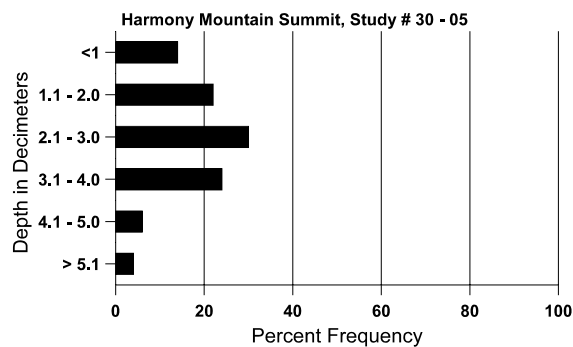
| Cover Type | Average Cover % | | |
|-------------|-----------------|-------|-------|
| | '92 | '98 | '03 |
| Vegetation | 33.00 | 60.90 | 53.04 |
| Rock | 0 | 2.23 | 1.72 |
| Pavement | .25 | 1.01 | .90 |
| Litter | 63.25 | 63.82 | 54.71 |
| Cryptogams | 0 | 0 | 0 |
| Bare Ground | 3.50 | 8.60 | 9.82 |

SOIL ANALYSIS DATA --

Management unit 30, Study no: 5, Study Name: Harmony Mountain Summit

| Effective rooting depth (in) | Temp °F (depth) | pH | %sand | %silt | %clay | %OM | PPM P | PPM K | ds/m |
|------------------------------|-----------------|-----|-------|-------|-------|-----|-------|-------|------|
| 17.2 | 52.2 (18.0) | 5.4 | 62.0 | 19.4 | 18.6 | 4.5 | 41.9 | 268.8 | 0.4 |

Stoniness Index



PELLET GROUP DATA --

Management unit 30 , Study no: 5

| Type | Quadrat Frequency | | Days use per acre (ha) | |
|--------|-------------------|-----|------------------------|----------|
| | '98 | '03 | '98 | '03 |
| Sheep | 2 | - | - | - |
| Rabbit | - | 4 | - | - |
| Deer | 44 | 50 | 73 (180) | 88 (217) |
| Cattle | 18 | 11 | 26 (64) | 32 (79) |

BROWSE CHARACTERISTICS --

Management unit 30 , Study no: 5

| | | Age class distribution (plants per acre) | | | | | Utilization | | | | |
|--|--|--|-------|--------|----------|------|---------------|------------|---------------|--------------------|------------------------------------|
| Y e a r | Plants per Acre (excluding seedlings) | Seedling | Young | Mature | Decadent | Dead | % moderate | % heavy | % decadent | % poor vigor | Average Height Crown (in) |
| <i>Amelanchier utahensis</i> | | | | | | | | | | | |
| 82 | 0 | - | - | - | - | - | 0 | 0 | - | 0 | -/- |
| 92 | 0 | - | - | - | - | - | 0 | 0 | - | 0 | -/- |
| 98 | 0 | - | - | - | - | - | 0 | 0 | - | 0 | -/- |
| 03 | 0 | - | - | - | - | - | 0 | 0 | - | 0 | 16/19 |
| <i>Artemisia tridentata vaseyana</i> | | | | | | | | | | | |
| 82 | 1532 | - | 66 | 800 | 666 | - | 57 | 0 | 43 | 0 | 15/12 |
| 92 | 6666 | 1933 | 4266 | 2000 | 400 | - | 14 | 1 | 6 | 5 | 15/30 |
| 98 | 6060 | 880 | 1580 | 4060 | 420 | 240 | 3 | 0 | 7 | .33 | 16/24 |
| 03 | 8640 | 340 | 2500 | 5740 | 400 | 80 | 15 | 5 | 5 | 2 | 15/24 |
| <i>Chrysothamnus parryi</i> | | | | | | | | | | | |
| 82 | 0 | - | - | - | - | - | 0 | 0 | 0 | 0 | -/- |
| 92 | 666 | 133 | 266 | 400 | - | - | 30 | 0 | 0 | 0 | 7/6 |
| 98 | 0 | - | - | - | - | - | 0 | 0 | 0 | 0 | -/- |
| 03 | 780 | - | 100 | 540 | 140 | - | 36 | 0 | 18 | 3 | 6/8 |
| <i>Chrysothamnus viscidiflorus viscidiflorus</i> | | | | | | | | | | | |
| 82 | 8666 | - | 2133 | 5000 | 1533 | - | 0 | 0 | 18 | 0 | 12/15 |
| 92 | 14132 | 400 | 3466 | 9666 | 1000 | - | 11 | 1 | 7 | 2 | 11/13 |
| 98 | 11140 | 220 | 1860 | 8420 | 860 | 20 | .35 | 0 | 8 | 0 | 13/21 |
| 03 | 12100 | - | 1660 | 9780 | 660 | 40 | .16 | 0 | 5 | .16 | 11/18 |
| <i>Eriogonum microthecum</i> | | | | | | | | | | | |
| 82 | 4733 | - | 1400 | 2933 | 400 | - | 4 | 0 | 8 | 0 | 10/12 |
| 92 | 10799 | - | 5933 | 4600 | 266 | - | 6 | 0 | 2 | 3 | 5/7 |
| 98 | 0 | - | - | - | - | - | 0 | 0 | 0 | 0 | -/- |
| 03 | 0 | - | - | - | - | - | 0 | 0 | 0 | 0 | -/- |
| <i>Mahonia repens</i> | | | | | | | | | | | |
| 82 | 0 | - | - | - | - | - | 0 | 0 | - | 0 | -/- |
| 92 | 0 | - | - | - | - | - | 0 | 0 | - | 0 | -/- |
| 98 | 120 | - | - | 120 | - | - | 0 | 0 | - | 0 | 5/7 |
| 03 | 140 | - | - | 140 | - | - | 0 | 0 | - | 0 | 2/3 |
| <i>Populus tremuloides</i> | | | | | | | | | | | |
| 82 | 0 | - | - | - | - | - | 0 | 0 | - | 0 | -/- |
| 92 | 0 | - | - | - | - | - | 0 | 0 | - | 0 | -/- |
| 98 | 20 | 20 | 20 | - | - | - | 0 | 0 | - | 0 | -/- |

| | | Age class distribution (plants per acre) | | | | | Utilization | | | | |
|----------------------------------|--|--|-------|--------|----------|------|---------------|------------|---------------|--------------------|------------------------------------|
| Y e a r | Plants per Acre (excluding seedlings) | Seedling | Young | Mature | Decadent | Dead | % moderate | % heavy | % decadent | % poor vigor | Average Height Crown (in) |
| 03 | 0 | - | - | - | - | - | 0 | 0 | - | 0 | -/- |
| <i>Quercus gambelii</i> | | | | | | | | | | | |
| 82 | 0 | - | - | - | - | - | 0 | 0 | - | 0 | -/- |
| 92 | 0 | - | - | - | - | - | 0 | 0 | - | 0 | -/- |
| 98 | 0 | - | - | - | - | - | 0 | 0 | - | 0 | 157/106 |
| 03 | 0 | - | - | - | - | - | 0 | 0 | - | 0 | 16/15 |
| <i>Ribes viscosissimum</i> | | | | | | | | | | | |
| 82 | 0 | - | - | - | - | - | 0 | 0 | - | 0 | -/- |
| 92 | 0 | - | - | - | - | - | 0 | 0 | - | 0 | -/- |
| 98 | 0 | - | - | - | - | - | 0 | 0 | - | 0 | 31/31 |
| 03 | 0 | - | - | - | - | - | 0 | 0 | - | 0 | 47/48 |
| <i>Symphoricarpos oreophilus</i> | | | | | | | | | | | |
| 82 | 0 | - | - | - | - | - | 0 | 0 | - | 0 | -/- |
| 92 | 0 | - | - | - | - | - | 0 | 0 | - | 0 | -/- |
| 98 | 20 | - | - | 20 | - | - | 100 | 0 | - | 0 | 25/51 |
| 03 | 60 | - | - | 60 | - | - | 0 | 0 | - | 0 | 23/47 |